REMARKS

Upon entry of the foregoing Amendment, claims 1, 3-6, 8-11, and 14-26 will be pending in the application. Of these, claims 1, 14, 15, 25, and 26 are independent. Claim 14 will be amended. Claims 25 and 26 will be added as new claims.

This Amendment is being filed concurrently with a Request for Continued Examination and fee under 37 C.F.R. § 1.114. Accordingly, Applicants respectfully request that the Amendment be entered.

Rejections Under 35 U.S.C. § 112

Claims 14-23 stand rejected under 35 U.S.C. § 112, first and second paragraphs for allegedly failing to comply with the written description requirement and allegedly being indefinite. With this Amendment, Applicants amend independent claim 14 to recite that "primary gas supply holes formed in a specific area are surrounded by circulating gas supply holes formed in a number larger than the number of said primary gas supply holes in said specific area." Independent claim 15 does not recite the different spacing that the Patent Office alleges does not comply with § 112. Accordingly, claim 15 is not amended. Claims 16-23 depend from claim 14. Applicants respectfully request that the Examiner withdraw the rejections of these claims.

Rejections Under 35 U.S.C. § 103

Claims 1, 3-6, 8-11, and 14-23

The Examiner rejected claims 1, 3-6, 8-11, and 14-23 under 35 U.S.C. § 103 as being unpatentable over JP 409251981A to Kurihara *et al.* (Kurihara) in view of U.S. Patent No. 6,086,677 to Umotoy *et al.* (Umotoy) and in view of U.S. Patent No. 5,453,124 to Moslehi *et al.* (Moslehi). Claim 1 is directed to a processing apparatus

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

including a gas supply mechanism that supplies a processing gas into a processing chamber via a plurality of gas supply holes including a plurality of primary gas supply holes and a plurality of circulating gas supply holes. The apparatus includes an evacuating mechanism that evacuates the processing gas from the processing chamber, and a gas circulating mechanism that returns at least a portion of exhaust gas evacuated from the processing chamber to the gas supply mechanism. The gas supply mechanism includes a primary gas supply system. The primary gas supply system supplies primary gas supplied from a processing gas source into the processing chamber via the primary gas supply holes. A circulating gas supply system supplies at least a portion of the exhaust gas into the processing chamber via the circulating gas supply holes. The primary gas supply system and the circulating gas supply system are systems independent of each other. Further, the ratio of the number of primary gas supply holes and the number of circulating gas supply holes equals the target ratio of the primary gas flow rate and the circulating gas flow rate. The flow rate of the circulating gas is higher than the flow rate of the primary gas, so that the number of circulating gas supply holes is greater than the number of primary gas supply holes. The hole radius and the hole density of the primary gas supply holes are constant over an entire surface and the hole radius and the hole density of the circulating gas supply holes are constant over the entire surface.

Kurihara teaches a semiconductor manufacturing system that includes a chemical cylinder 111 which supplies process gas to a vacuum tube 101 through a nozzle. A turbo molecular pump 105 is connected to the vacuum tube 101, and a recycle line 107 extends between the exhaust side of the pump 105 and the vacuum

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

tube 101. *See* Kurihara, paragraph 11. FIG. 5 shows the holes from the recycle line being located at one side of the nozzle and the holes from the process gas supply being located at the other side of the nozzle.

Umotoy teaches a dual gas faceplate for a showerhead in a semiconductor wafer processing system. The showerhead includes a portal region 200 having two sets of holes 204 and 206, that provide gases to a process region without commingling the gases prior to entering the process region. *See* Umotoy, column 2, lines 39-43; column 2, line 66-column 3, line 1. The hole size, however, may vary across the faceplate surface so that gas flow rates through the holes are correlated with the location of the hole in the faceplate. *See* Umotoy, column 5, lines 38-43.

Moslehi discloses a multi-zone gas injector 12 with a showerhead plate 18 that includes a plurality of orifices 22 located in a center zone 24. A plurality of orifices 26 are arranged in an annular configuration encircling the center zone 24, and forming a middle zone 28. A third series of orifices 30 are arranged in an annular configuration to encircle the orifices 26. *See* Moslehi, column 3, lines 47-58. Each zone is attached to a flow control for independently controlling the amounts and ratios of gas to each zone. *See* Moslehi, Abstract.

However, none of Kurihara, Umotoy, and Moslehi, alone or in combination, establishes a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference(s) must teach or suggest all the claim limitations. The teaching or suggestion to make the

FINNEGAN
HENDERSON
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GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
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claimed combination and the reasonable expectation of success must both be found in the prior art, not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991). *See* MPEP § 2143.

There is no suggestion or motivation in the art to combine Kurihara, Umotoy, and Moslehi in the manner suggested by the Examiner. The teaching or suggestion to make the claimed combination must be found in the prior art, and not based on the Applicants' disclosure. The Office Action combination relies upon Moslehi to teach that injector parameters can be varied. *See* Office Action, page 4. It then states that the parameters relating to gas distribution are driven by "process requirements" and that "the number of circulating holes are related to the conductance and the flow of circulating gas and are therefore driven by the process requirement as taught by Moslehi." *See* Office Action, page 6. However, this blanket statement does not amount to a motivation to combine and does not establish a *prima facie* case of obviousness.

Motivation to combine can "not be resolved on subjective belief." *In re Lee*, 277 F.3d 1338, 1333-34 (Fed. Cir. 2002). It must be stated affirmatively and specifically. *See id* at 1333. The Office Action fails to provide motivation for combining Moslehi with the Kurihara and Umotoy. In the absence of any motivation to combine, the rejection is improper.

Additionally, the combination does not teach or suggest all the features recited in claims 1, 14, and 15. Moslehi is relied upon to for the teaching that parameters may be driven by process requirements. But the combination, including Moslehi, does not teach or suggest a system having all the features recited in the claims.

FINNEGAN
HENDERSON
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GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
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First, Moslehi does not disclose any system having all the features of claims 1 and 14 with process requirements that teach or suggest that the number of circulating gas holes is larger that the number of primary gas holes. This feature is a structural requirement recited in the apparatuses of claims 1 and 14. It is not an abstract parameter. Even if Moslehi does teach that process requirements may drive parameters, it does not teach or suggest providing a number of circulating gas holes that is greater than the number of primary gas holes. Accordingly, for at least this reason, claims 1 and 14 are allowable over the combination of references.

Second, Moslehi does not disclose any system having all the features of claim 15 with process requirements that teach or suggest that the total area of the circulating gas holes is larger than the total area of the primary gas holes. This feature is a structural requirement recited in the apparatus of claim 15. Even if Moslehi does teach that process requirements may drive parameters, it does not teach or suggest the total area over which the circulating gas holes are formed is larger than the total area over which the primary gas holes are formed. Accordingly, for at least this reason, claim 15 is allowable over the combination of references.

Third, Moslehi does not disclose any system having process requirements that teach or suggest that the flow rate of gas flowing through the circulating gas holes is higher than the flow rate of the gas flowing through the primary gas holes. This feature is recited in claims 1, 14, and 15. Again, even if Moslehi teaches that process requirements drive parameters, it does not teach or suggest the recited claim limitations. Again, this reason alone distinguishes claims 1, 14, and 15 from the combination of references.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

The Office Action alleges that Moslehi suggests that the number or area of holes could be varied based upon process requirements. But it does not teach or suggest the features discussed above. Alone or in combination with Kurihara and Umotoy, Moslehi does not render obvious a system having all the recited features of claims 1, 14, and 15. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection and allow these claims.

Claims 3-6, 8-11, and 16-23 depend from and add additional features to independent claims 1 and 14. Accordingly, these claims are patentable for at least the reasons set forth above with regard to claims 1 and 14. Applicants respectfully request that the Examiner reconsider and withdraw this rejection.

New Claims

New claims 25 and 26 are allowable over the prior art because they recite many of the features of claims 1, 14, and 15, plus additional patentable features. Except for the constant hole radius and density, claim 25 recites all the features of the processing apparatus of claim 1, plus new features including a showerhead and piping having a means for flow rate adjustment. Support for the flow rate adjustment can be found in the Specification at page 26, lines 25-page 27, line 2. Claim 26 recites all the features of the processing apparatus of claim 1, including a new feature where the circulating gas flow rate is set to circulate approximately 80% of the exhaust gas evacuated from the processing chamber. Support for the new feature may be found in the Specification at page 21, lines 6-10. None of the cited references in any combination teach or suggest all the features of claims 25 and 26.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

Conclusion

The claims are neither anticipated nor rendered obvious in view of the cited prior art references. Applicants therefore request the timely allowance of the pending claims. Please grant any extensions of time required to enter this response and charge any additional required fees, including any excess claim fees, to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

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By: _____
Dustin T. Johnson
Reg. No. 47,684

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com